

Present in clause 2.10 of the curriculum.

2.9 Teaching learning methods

As shown in clause 2.4 course outline.

2.10 Content of each subject in each year

HUMAN ANATOMY

(I) GOAL

The broad goal of teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body to provide a basis for understanding the clinical correlation of organs or structures involved and the anatomical basis for the disease presentations

(II) OBJECTIVES

At the end of the course the students shall be able to:

(A) Knowledge

- Comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body.
- Identify the microscopic structure and correlate elementary ultra-structure of various organs and tissues and correlate the structure with the functions as a prerequisite for understanding the altered state in various disease processes.
- Comprehend the basic structure and connections of the central nervous system and analyse the integrative and regulative functions of the organs and systems. He/She shall be able to explain the developmental basis of the major variations and abnormalities.
- Demonstrate knowledge of the basic principles and sequential development of the Organs and systems; recognize the critical stages of development and the effects of common teratogen, genetic mutations and environmental hazards. He /She shall be able to explain the developmental basis of the major variations and abnormalities.

(B) Skills

At the end of the course the student shall be able to:

- Identify and locate all the structures of the body and mark the topography of the living anatomy
- Identify the organs and tissues under the microscope
- Understand the principles of Karyotyping and identify the gross congenital anomalies.
- Understand principles of newer imaging techniques and interpretation of Computerized Tomography (CT) Scan sonogram etc.
- Understand clinical basis of some common clinical procedures i.e. intramuscular and intravenous injection, lumbar puncture and kidney biopsy etc.

(C)Integration

From the integrated teaching of other basic sciences, students shall be able to comprehend the regulation and integration of the functions of the organs and systems in the body and thus interpret the anatomical basis of disease process.

(III) DETAILED SYLLABUS-DETAILS OF THE COURSE

Duration of the Course

Semesters	2
Total number of hours	650
Lectures	95
Seminars	37
Practicals	518

Innovation session (projects, structured discussion, integrated teaching, formative evaluation and revision) Part of practicals:

DETAILS OF LECTURES

1. General Anatomy

: 15hr

- Epithelium: Classification, simple and compound epithelium, glandular and sensory epithelium : 2hr
- Connective tissue: Cells, matrix : 2hr
- Cartilage: Classification, structure, cells and matrix : 1hr
- Bone: Types, types of epiphysis, microscopy. Ossification in brief, blood supply : 2hr
- Joints: Classification and structure of synovial joint : 1hr
- Vascular tissue: Elastic artery, medium sized artery, large vein : 1hr
- Lymphatic tissue: General features, lymph node- structure and function, spleen, structure and circulation, Tonsil, Thymus : 2hr
- Muscular tissue: Structure of Skeletal, Smooth and cardiac Muscles : 1hr
- Skin: Structure of thin and thick skin : 1hr
- Nervous tissue: Neurons, Neuroglia, peripheral nerve structure optic nerve structure, Schwann cells, myelination, myelinated nerve fibre, Ganglia : 2hr

2General Embryology

: 11hr

- Oogenesis, Ovarian Cycle :
1hr
- Menstrual cycle :
1hr
- Male reproductive system- Spermatogenesis :
1hr
- Fertilization, Implantation, assisted reproductive techniques :
1hr
- Bilaminar embryo :
1hr

- Trilaminar embryo : 1hr
- Intraembryonic mesoderm and folding of embryo : 2hr
- Formation and circulation of placenta : 1hr
- Foetal membranes : 1hr
- Twinning and teratology (Structure of Umbilical cord and placenta to be taught along with General Embryology) : 1hr

2 Gross Anatomy

(X-rays and surface marking of each region to be taken after the dissection of the corresponding region is completed)

Upper Limb : 4hr

- Brachial plexus : 1hr
- Mammary gland : 1hr
- Shoulder joint:
- Palmar space : 1hr

Seminars (Give more importance to applied Anatomy) : 8hr

- Axilla and Axillary artery : 1hr
- Venous and lymphatic drainage of upper limb : 1hr
- Radio-Ulnar joints, Pronation & supination : 1hr
- Brachial artery, Anastomoses around elbow joint : 1hr
- Radial nerve, Ulnar nerve, Median nerve : 2hr
- Retinacula : 1hr
- Elbow joint, wrist joint, 1st carpometacarpal Joint : 1hr

Lower Limb : 4hr

- Hip joint : 1hr
- Arches of foot : 1hr
- Knee joint : 1hr
- Development of Limbs, Dermatomes of Upper and Lower Limbs : 1hr

Seminars (Give more importance to applied Anatomy) : 6hr

- Venous and lymphatic drainage of lower limb : 1hr

- Femoral triangle, Adductor canal : 1hr
- Obturator nerve, Sciatic Nerve : 1hr
- Femoral artery and nerve : 1hr
- Ankle joint, Popliteal fossa : 1hr
- Sub talar joint, inversion and eversion : 1hr

Thorax : 9 hr

- Thoracic wall (including movements) : 1hr
- Pleura : 1hr
- Lungs including development of lung : 1hr
- Pericardium : 1hr
- Blood supply of heart : 1hr
- Arterial arches : 1hr
- Foetal circulation : 1hr
- Development of heart : 2hr

Seminars (Give more importance to applied Anatomy)

: 5hr

- Mediastinum-Boundaries and contents : 1hr
- Thoracic duct, Esophagus, Thoracic Aorta : 1hr
- Veins of Thorax: 1hr
- Chambers of heart-All chambers : 1hr
- Splanchnic nerves, sympathetic trunk : 1 hr

Genetics : 4hr

- Classification of chromosomes, karyotyping, sex chromosomes, Barr body : 1hr
- Normal male, normal female, Chromosomal aberrations-in brief : 1hr
- Turner's syndrome, Klinefelter's syndrome and Down's syndromes (Charts to be shown) Genetic Counseling, Pedigree Chart, Genetic Engineering and inheritance : 2hr

Head& Neck	: 17hr
• Scalp	: 1hr
• Parotid Gland	: 1hr
• Development of face	: 1hr
• Pituitary gland	: 1hr
• Dural venous sinuses	: 1hr
• Cervical fascia	: 1hr
• Development of branchial arches	: 1hr
• Extra Ocular muscles	: 1hr
• T. M. Joint	: 1hr
• Thyroid gland	: 1hr
• Cervical Sympathetic	: 1hr
• Pharynx	: 1hr
• Larynx	: 1hr
• Eyeball, Layers-development in brief	: 1hr
• Tongue	: 1hr
• Facial Nerve	: 1hr
• Middle Ear	: 1hr

Seminars (Give more importance to applied Anatomy)	: 12hr
• Suboccipital triangle	: 1hr
• Eyelid and lacrimal apparatus	: 1hr
• Nasal cavity, PNS	: 1hr
• Soft palate, Palatine tonsil	: 1hr
• Muscles of facial expression	: 1hr
• Vessels and nerves of the face	: 1hr
• Posterior triangle of neck	: 1hr
• Anterior triangles of neck	: 1hr
• Mandibular nerve, oculomotor nerve	: 1hr
• Submandibular and sublingual gland	: 1hr
• Lymph nodes of head and neck	: 1hr
• Hyoglossus muscle	: 1hr

Brain and Spinal Cord	:15Hr
• Spinal cord- external features and blood supply	: 1hr
• Blood supply of brain- Superficial and deep,	: 1hr
• Meninges & cisterns	: 1 hr
• Medulla oblongata	: 1hr
• Pons	: 1hr

- Cerebellum : 1hr
- 4th Ventricle : 1hr
- 3rd Ventricle, Lateral ventricles : 1hr
- Midbrain : 1hr
- Sulci, gyri and functional areas of cortex : 1hr
- White matter & Internal capsule : 1hr
- Visual pathway : 1hr
- Basal ganglia : 1hr
- Thalamus : 1hr
- Development of CNS IN BRIEF including functional Column : 1hr

Abdomen, Pelvis, and Perineum : 16hrs

- Anterior abdominal wall and Rectus sheath : 1hr
- Inguinal canal, Spermatic cord and descent of testis : 1hr
- Peritoneum in brief : 1hr
- Development of GIT, derivatives and anomalies : 1hr
- Stomach including development : 1hr
- Portal vein : 1hr
- Liver : 1hr
- Kidney - gross features, development and anomalies : 1hr
- Diaphragm - gross features, development : 1hr
- Uterus - gross features, development and anomalies : 1hr
- Prostate and male urethra : 1hr
- Rectum and Anal canal : 1hr
- Urinary bladder : 1hr
- Perineal Pouches : 1hr
- Ischiorectal fossa : 1hr
- Pelvic floor : 1hr

Seminars (Give more importance to applied Anatomy Lymphatic drainage and blood supply of all organs should be given importance) : 6hr

- Duodenum and development : 1hr
- Pancreas, spleen : 1hr
- Extra hepatic biliary apparatus : 1hr
- Coeliac trunk, Supra renal gland : 1hr
- Ureter, Pudendal nerve : 1hr
- Caecum, Vermiform appendix : 1hr

Diagrams

I Cross Section Diagrams

A upper limb

No.	Name	Fig.	Pg.No	Book
1.	Section through middle of arm	68	68	Cunningham's manual of practical Anatomy 15th Edn Vol. 1
2.	Oblique section through the hand	88	90	Cunningham's manual of practical Anatomy 15th Edn Vol. 1
B. Lower limb				
1.	Transverse section through middle of right thigh	80.2	1351	Gray's Anatomy 40 th Edn
2.	Transverse section through middle of leg	182	196	Cunningham's manual of practical Anatomy 15th Edn Vol. 1
3.	Transverse section through knee joint	202	218	Cunningham's manual of practical Anatomy 15th Edn vol.1
C. Neck				
	Transverse section through the neck at the level of cricoid(C6 level) cartilage	62	76	Cunningham's manual of practical Anatomy 15th Edn Vol-3
D. Thorax				
1	Horizontal section through the thorax at the level of T-4 Vertebra	70	58	Cunningham's manual of practical Anatomy 15th Edn Vol-2
E. Abdomen				
1	Horizontal section through the abdomen at the level of epiploic foramen-T12 vertebra	139	124	Cunningham's manual of practical Anatomy 15th Edn Vol-2
2	Horizontal section through the abdomen at the level pylorus - L1 vertebra	128	116	Cunningham's manual of practical Anatomy 15th Edn Vol-2
3	Horizontal section through the abdomen at the level of -L4	129	116	Cunningham's manual of practical Anatomy 15th Edn Vol-2
F. Brain				
1	Transverse section of spinal cord showing ascending & descending tracts.	6.8	80	IB singh Text Book of Neuro Anatomy 9 th Edn.
2	Transverse section of medulla at the level of Pyramidal decussation	8.2	96	IB singh Text Book of Neuro Anatomy 9 th Edn.
3	Transverse section of medulla at the level of sensory decussation	8.3	97	IB singh Text Book of Neuro Anatomy 9 th Edn.
4	Transverse section of medulla at the level of olive	8.4	98	IB singh Text Book of Neuro Anatomy 9 th Edn.

5	Transverse section at the level of lower part of pons (at the level of facial colliculus)	8.9	102	IB singh Text Book of Neuro Anatomy 9 th Edn.
6	Transverse section at the level of upper part of pons	8.11	104	IB singh Text Book of Neuro Anatomy 9 th Edn.
7	Transverse section at the level of lower part of mid brain (at the level of inferior colliculus)	8.16	106	IB singh Text Book of Neuro Anatomy 9 th Edn.
8	Transverse section at the level of upper part of mid brain (at the level of superior colliculus)	8.19	108	IB singh Text Book of Neuro Anatomy 9 th Edn.
9	Horizontal section at the level of inter ventricular foramen	282	286	Cunningham's manual of practical Anatomy 15th Edn Vol-3
II SAGITTAL SECTION				
1	Sagittal section through shoulder	64	65	Cunningham's manual of practical Anatomy 15th Edn Vol-1
2	Median section of brain	238	255	Cunningham's manual of practical Anatomy 15th Edn Vol-3
3	Median section through male pelvis	235	216	Cunningham's manual of practical Anatomy 15th Edn Vol-2
4	Median section through female pelvis	236	216	Cunningham's manual of practical Anatomy 15th Edn Vol-2
111 GROSS ANATOMY				
A Upper limb				
1	Typical spinal Nerve	2	6	Cunningham's manual of practical Anatomy 15th Edn Vol-1
2	Brachial plexus	24	33	Cunningham's manual of practical Anatomy 15th Edn Vol-1
3	Anastomosis around elbow joint	80	82	Cunningham's manual of practical Anatomy 15th Edn Vol-1
4	Superficial palmar arch 4 Deep palmar arch	90	92	Cunningham's manual of practical Anatomy 15th Edn Vol-1
B Lower limb				
1	Femoral triangle	131	140	Cunningham's manual of practical Anatomy 15th Edn Vol-1
2	Longitudinal arches of foot - Medial -	213	226	Cunningham's manual of practical Anatomy 15th Edn Vol-1

3	Structures surrounding the hip joint	81.5	1377	Gray's Anatomy 41 st Edn.
C	Thorax			
1	Typical intercostal space	16	12	Cunningham's manual of practical Anatomy 15th Edn Vol-2
2	Relations of heart & great vessels to the anterior wall of thorax Surfacemarking- Borders , Surfaces, valves of heart)	53	44	Cunningham's manual of practical Anatomy 15th Edn Vol-2
3	Sternocostal surface of the heart	51	41	Cunningham's manual of practical Anatomy 15th Edn Vol-2
4	Mediastinal surface of lung -Left lung	40	32	Cunningham's manual of practical Anatomy 15th Edn Vol-2
5	Mediastinal surface of lung - Right lung	41	33	Cunningham's manual of practical Anatomy 15th Edn Vol-2
d. Abdomen				
1	Visceral surface of liver	176	156	Cunningham's manual of practical Anatomy 15th Edn Vol-2
2	Structures seen posterior to the stomach	149	132	Cunningham's manual of practical Anatomy 15th Edn Vol-2
3	Anterior surface of right and left kidneys showing relations	191	169	Cunningham's manual of practical Anatomy 15th Edn Vol-2
4	Posterior surface of right and left kidneys showing	190	168	Cunningham's manual of practical Anatomy 15th Edn Vol-2
e. Head and neck				
1	Diagrammatic section of eyeball	164	184	Cunningham's manual of practical Anatomy 15th Edn Vol-3
2	Dissection of submandibular region showing hyoglossus muscle	111	131	Cunningham's manual of practical Anatomy 15th Edn Vol-3
3	Distribution of cutaneous nerves to Head & Neck	75	98	Cunningham's manual of practical Anatomy 15th Edn Vol-3
f. Brain				
1	Circle of willis	196	218	Cunningham's manual of practical Anatomy 15th Edn Vol-3
2	Blood supply of cerebrum			
a	Inferior Surface	197	198	Cunningham's manual of practical Anatomy 15th Edn Vol-3

b	Superolateral surface	201	221	Cunningham's manual of practical Anatomy 15th Edn Vol-3
c	Medial surface	232	250	Cunningham's manual of practical Anatomy 15th Edn Vol-3
6	Floor of IV ventricle- posterior view	227	243	Cunningham's manual of practical Anatomy 15th Edn Vol-3
7	Sulci, gyri of cerebral hemisphere			
a	Superolateral surface	13.6A	182	IB singh Text Book of Neuro Anatomy 9 th Edn.
b	Medial surface	13.8A	184	IB singh Text Book of Neuro Anatomy 9 th Edn.
c	Inferior Surface	13.10 A	186	IB singh Text Book of Neuro Anatomy 9 th Edn.

The question on the diagrams in the question paper carrying 4 marks

(2marks each in both Paper 1 & paper 2 should be STRICTLY limited from the above list only)

DETAILS OF PRACTICALS- Dissection including Osteology and Histology)

Upper Limb

: 60hrs

- Introduction, Pectoral region and axilla, cutaneous nerves and vessels
- The brachial plexus, Axillary artery
- The dissection of back
- The free upper limb Lymph vesels and lymph nodes of upper limb cutaneous nerves of upper limb and deep fascia of upper limb
- The shoulder- movements of the limb at the shoulder, the shoulder joint
- The arm- Cubital fossa, anterior compartment, Posterior compartment of arm
- The forearm and hand, Palmar aponeurosis, superficial palmar arch, Flexor retinaculum, Flexor tendons
- The arteries and nerves of the flexor compartment of the forearm
- Muscles of the front of the forearm and hand, deep palmar arch, Fascial compartments of the palm
- The extensor compartment of the forearm and the hand, Extensor tendons of the fingers Joints of the upper limb
- Elbow joint, wrist joint, radio ulnar joints, intercarpal , carpo metacarpal & Intermetacarpal joints

Lower limb

: 60 hrs

- Front of thigh, femoral triangle, adductor canal
- Medial side of thigh

- Gluteal region
- Popliteal fossa
- Back of thigh
- Hip joint
- Front of leg and dorsum of foot, superficial dissection
- Anterior compartment of leg
- Lateral and medial compartments of leg, back of leg
- Sole of the foot I and II layers, III and IV layers, V and VI layers
- Knee joint, Ankle joint, Tibio-fibular and other joints, revision

Thorax

: 30hrs

- Introduction: Walls of thorax,
- Cavity of thorax, pleura
- Mediastinum, Root of lungs Autonomic nervous system
- The lungs, Anterior mediastinum
- Middle mediastinum, surface anatomy of the heart, blood supply
- Chambers of heart, right atrium, right ventricle, left ventricle
- Aorta, superior mediastinum arch of aorta, left atrium
- Conducting system of heart, Thoracic part of aorta Vagus, Oesophagus, Thoracic duct, Posterior intercostal vessels,
- Joints of thorax, Revision

Head & Neck

: 130 hrs

- Cervical vertebrae, Skull, The scalp
- The temple and the face, Nerves and vessels of scalp and superficial temporal region, The superficial dissection of face
- The side of the neck, Posterior triangle, Sub occipital triangle
- The anterior triangle of neck, The median region of the front of neck, subdivisions of anterior triangle,
- The cranial cavity: Structures seen after removal of cerebrum, Anterior cranial fossa, middle cranial fossa, posterior cranial fossa
- Deep dissection of the face: Nerves of the face, Structures in the cheek and lips The eyelids, The lacrimal apparatus
- The orbits, The structures in the orbits, extraocular muscles, nerves, ophthalmic artery
- The parotid region, The parotid gland, facial nerve, vessels
- The temporal and infratemporal region Temporal fascia, Temporalis muscle The Superficial contents of the infratemporal fossa Temporomandibular joint, The deeper contents of the infratemporal fossa,
- the submandibular gland, mylohyoid muscle, hyoglossus
- The mouth and pharynx, Pharyngeal wall, subdivisions of pharynx, soft palate
- The cavity of the nose, nasal septum, lateral wall
- The larynx,
- The tongue
- The organs of hearing and equilibrium

- The eye ball
- The contents of the vertebral canal,
- The joints of the neck.

Brain

: 42 hrs

- Introduction: The membranes of the brain- meninges
- The blood vessels of the brain
- The medulla, pons,
- The cerebellum, The fourth ventricle The midbrain,
- The cerebrum – sulci, gyri & functional areas
- The White matter of cerebrum III ventricle, the lateral ventricle and the choroid fissure
- The thalami and the optic tracts
- The deep dissection of the hemisphere, deep nuclei of the telencephalon,
The nuclei and connections of the thalamus, Cerebral topography

Abdomen

: 124 hrs

- Introduction: Anterior abdominal wall muscles, inguinal canal Nerves and vessels of anterior abdominal wall
- Male external genital organs
- Dissection of the loin
- Abdominal Cavity Shape, Boundaries, Divisions of peritoneal cavity Ligaments of liver, Spleen
- Oesophagus, Vagal trunk, Stomach
- Mesentery, Superior mesenteric artery, Inferior mesenteric artery, Arterial anastomosis in GI tract, Structure of small intestine, Large intestine
- Duodenum, Portal vein, Ducts of liver Pancreas, Liver, Gall bladder, Cystic duct
- Abdominal structures in contact with diaphragm Autonomic nervous system
Supra renal glands, The kidneys, Abdominal part of ureter
- The diaphragm, The posterior abdominal wall muscles, The inferior vena cava,
Lymph nodes of posterior abdominal wall, The nerves of posterior abdominal wall,
- The pelvic viscera, ovaries, uterine tubes, Pelvic part of ureters
- Urinary bladder, Internal surface of urinary bladder, Ductus deferens, Prostate, Male urethra,
- Uterus, Rectum, Anal canal
- Vessels of lesser pelvis, nerves of lesser pelvis, Obturator nerve, Autonomic nerves
- The muscles of lesser pelvis, pelvic diaphragm
- Joints of pelvis

Perineum

:12 hrs

- Ischiorectal fossa,
- Perineal pouches Perineal body, Pudendal canal

Histology

: 60 hrs

- Epithelium
- Connective tissue

- Cartilage- Hyaline, elastic, fibro cartilage
- Bone- Compact bone- C.S & L.S
- Muscles- Skeletal, Smooth, cardiac
- Nervous tissue- neuron, nerve fibre, sciatic and optic nerves, sympathetic, spinal ganglia
- Blood vessel- Large and medium sized artery, large and medium sized vein
- Lymphoid tissue- lymph node, spleen, thymus, palatine tonsil
- Skin- thin, thick
- Mammary gland-active & inactive
- Placenta & umbilical cord
- Respiratory system- trachea & lung
- Nervous system- spinal cord, cerebrum cerebellum
- Cornea, retina
- Endocrine system- thyroid, parathyroid, supra renal, pituitary
- Excretory system- kidney, ureter, urinary bladder
- Reproductive system
 - a) Male - Testis epididymis, vas deferens, prostate
 - b) Female – ovary, uterus- proliferative and secretory, cervix, fallopian tube

Digestive system

- Salivary glands - mucous, serous & mixed,
- Pancreas, liver, gall bladder,
- Tongue – filiform, fungiform & circumvallate,
- Oesophagus stomach-fundus, pylorus,
- Duodenum, jejunum, ileum,
- Large intestine, vermiform appendix

Genetics

- Demonstration of karyotyping charts- Normal male, Normal female, Down syndrome, Turner's Syndrome, Klinefelter's Syndrome, Chromosome spread

Prescribed text books

1. Cunningham's Manual of Practical Anatomy-3 Volumes
2. Essentials of Human Anatomy-A.K.Datta, 3 Volumes
3. Inderbir Singh's Text Book of Anatomy -3 volumes
4. Human Embryology - I.B.Singh
5. IB Singh's Text Book of Human Neuro Anatomy
6. Human Neuro Anatomy-Vishram Singh
7. Text Book of Human Histology-Inder Bir Singh
8. Surface and Radiological Anatomy-A. Halim & A.C.Das
9. Text Book of Osteology by I.B.Singh
10. Text Book of General Anatomy-G.P.Pal
11. Clinically Anatomy-A Problem solving approach by Neeta V Kulkarni -2 Volumes
12. Gross Anatomy Text Books (3 Vol) – Dr. Vishram Singh

Reference text Books

1. Gray's Anatomy
2. Cunningham's text book of Anatomy
3. Grant's Atlas of Anatomy
4. Langman's Medical Embryology- T. W. Sadler
5. Clinical Neuro Anatomy- Richard S Snell
6. Essentials of Human Embryology- A. K. Datta
7. Essentials of Human Genetics- Bhatnagar, Kothari and Lopa Mehta
8. Histology Atlas- De Fiore
9. Text Book of Histology -Hamilton Bailey
10. Clinically Oriented Anatomy- Keith L Moore
11. Gray's Anatomy for students- Richard L Drake
12. The Developing Human- Moore and Persaud
13. Clinical Anatomy by Regions Richard S Snell
14. Human genetics -S.D.Gangane
15. Text Book of Human Histology-Gunasekharan

Evaluation**University Examination****Theory****Paper I - 50 marks ,****Paper II****- 50 marks****Viva Voce – 20 marks – 4 stations, Embryology, Osteology, Radiology,****Surface marking****Theory-Topic Division**

Paper I - General Embryology, General Anatomy, Genetics, Upper Limb, Lower Limb, Thorax

Paper II - Head and Neck, Brain, Abdomen, Pelvis, Perineum

University Practicals

Total 40 marks

- Histology - 15 marks
 - a) 14 spotters of ½ mark each to include one Karyotype also
 - b) Discussion 2 slides, one systemic and one general = 4 marks each
- Gross Anatomy - 25 marks
 - a) 10 spotters X 1 mark = 10 marks
 - b) Discussion
 - i) Above diaphragm – 8 marks
 - ii) Below diaphragm – 7 marks